



FACTSHEET: Radioactivity

What is Radioactivity?

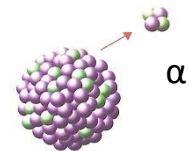
The basic building block of matter is the atom. Atoms are extremely small. They consist of a very small, very dense inner nucleus and an extended, spread out external shell. The nucleus of an atom consists of protons (positive charge) and neutrons (uncharged). The shell consists of electrons. Electrons are much lighter than protons and neutrons. Atoms have the same number of protons and electrons, so that they are electrically neutral from the outside. Different elements have atoms with different numbers of protons and electrons, for example a hydrogen atom has one proton and one electron, and a uranium atom has 92 protons and electrons.

Radioactivity is the disintegration of unstable atomic nuclei. If an atomic nucleus is large, or has too many protons relative to the number of neutrons, it may be unstable. Unstable nuclei emit energetic particles or electromagnetic waves. This is referred to as nuclear radiation, and atoms with unstable nuclei are called radioactive.

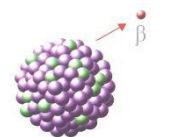
The Different Types of Nuclear Radiation

Radioactive nuclei emit three types of ionising radiation: alpha (α), beta (β), and gamma (γ) radiation.

α **Alpha radiation** consists of 2 protons and 2 neutrons. Of the three radiation types, it is the heaviest and most charged. It travels only a few cm in air and is easily stopped by a sheet of paper and by human skin.



β **Beta radiation** consists of electrons which are emitted from the nucleus. They are much lighter than alphas and only half as charged. They travel a few tens of cm in air or 1 to 2 cm in human tissue. Betas are easily stopped by a sheet of aluminum foil.



γ **Gamma radiation** is high energy electromagnetic radiation emitted from the nucleus. This type of radiation is emitted after an alpha or beta decay, as a result of the subatomic particles in the nucleus rearranging themselves, which results in the release of energy. Gamma radiation has no charge and no mass, and travels many meters in air. It can only be stopped by a thick layer of dense material, such as lead or concrete.

